

## PROCEDURE IN APPLICATION

These having been procured, the tin with the quantity of zinc-gelatin given above is set in a pan of water and heated. The limb is usually shaved, although this is not imperative, and a single layer of stockinette is pulled over it, smoothly, as one would a stocking. The melted zinc-gelatin is then worked into the stockinette with the hand. The hand works the warm mixture well into the meshes of the cloth, for it is adhesion between this lower layer of stockinette and the skin that counts; adhesion of the upper layers matters little. The gelatin should be applied as hot as the hand will bear. It is thin and workable when hot; as it cools it gets sticky and does not penetrate the meshes of the stockinette. The hand safeguards the patient against being scalded with too hot a mixture. A foot or so of the stockinette is left projecting below the sole of the foot and the rest is doubled back over the first layer. It is unnecessary to work further zinc-gelatin into the top layer of stockinette. It will stick by itself. A handful of absorbent cotton is dabbed onto the dressing to prevent its sticking to the bedclothes and the whole is powdered with talcum. The stockinette is slit over the back of the foot and the heel as far as the ankle, and the two lateral flaps thus formed are tacked to the spreader board. If the stockinette is narrow enough it will fit perfectly smooth without a crease or a fold; if it creases or folds, it is too wide and will not adhere.

An additional layer of zinc-gelatin and an additional wrapping with strips of Canton flannel placed transversely around the leg will add further support if much weight is to be used. The strips should be applied like shingles on a roof, beginning at the ankle, each turn being cut instead of reversed, as in applying an ordinary roller bandage.

## COMMENT

This Unna's gelatin dressing has been very useful. It may remain in place indefinitely—six to eight to ten weeks. It is left this length of time in old people with fractured femoral necks; the skin remains beautifully smooth and white under it.

If stockinette is not to be had, two longitudinal strips of firm unsized muslin may be used; these are covered with transverse strips of Canton flannel as described above.

If much weight is to be used a firmer material, muslin, or drill may be sewn as a reinforcement to the stockinette from the ankle down and around the spreader board.

It is scarcely necessary to recall the usefulness of this dressing in leg ulcers, varicose veins, and the chronic edema of limbs recently removed from splints and plaster of Paris dressings. This bandage is habitually put on patients with fractured legs before letting them out of bed, or immediately after removing plaster of Paris splints. But one layer of stockinette should be used and this always crossed with a transverse layer of Canton flannel or wide-meshed crinoline if the bandage is to prevent edema. Stockinette alone will not do; the strain is transverse and not longitudinal, as

with fracture appliances. The dressing is applied in the morning, before the leg is swollen; to apply it after the leg is edematous is useless. One dressing will last for six to eight weeks. It is cleaner, cheaper, and more comfortable than a rubber stocking, but it must not be wet. The patient must keep his leg out of the water when he bathes. Hot water will immediately melt the dressing; the easiest way to remove it is to put the patient into a warm tub.

490 Post Street.

## DISCUSSION

MAYNARD C. HARDING, M.D. (700 Electric Building, San Diego).—The dressing here described is one of the best. I do not believe, however, that it is really superior to Shiver's moleskin plaster. Orthopedic surgeons are used to leaving this plaster on as long as five months at a time, and have found it does not irritate. The newer rubber moleskin plasters are no better than ordinary adhesive, in my experience.

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RALPH SOTO-HALL, M.D. (350 Post Street, San Francisco).—I have had a limited experience with this method of traction, but have found that great importance should be given to the snugness with which the stockinette is applied. This stockinette should be very narrow or proper adhesion to the skin will not take place. Certainly adherence to every detail of the technique is necessary for success.

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H. W. CHAPPEL, M.D. (1136 West Sixth Street, Los Angeles).—Unna's gelatin dressing for traction, especially in fracture cases, has distinct advantages over other kinds of traction. The even pull on all of the skin under the dressing, the length of time the dressing can be used without changing, the excellent condition of the skin when the dressing is removed, and the ability to apply traction immediately, warrant a thorough trial of Doctor Eloesser and Doctor Rogers' method.

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DOCTOR ELOESSER (closing).—Since writing the above paper we note that Böhler of Vienna uses a zinc-gelatin traction dressing in fractures of the femur as an adjunct to skeletal traction by means of a Steinmann nail driven through the tibial tuberosity. (Technik der Knochenbruchbehandlung, Vienna, 1929.)

## GOITER OPERATIONS IN MENTAL DISEASES\*

By GEORGE H. SANDERSON, M. D.

AND

MARGARET SMYTH, M. D.

Stockton

DISCUSSION by Thomas G. Inman, M.D., San Francisco; Clarence G. Toland, M.D., Los Angeles.

THE idea that there might be a connection between disturbances of the thyroid gland and mental disease is not a new one. Parry,<sup>1</sup> in his classical description of exophthalmic goiter in 1786, mentions that it may be associated with mental phenomena. Graves<sup>2</sup> in 1835 noted the frequency of severe hysteria in this condition. Alex Robertson<sup>3</sup> in 1874 held the view that Graves' disease was due to an inflammation of the cervical sympathetic, and that the accompanying exophthalmos and insanity were due to hyperemia in the affected organs from this cause, just as was goiter in the thyroid. In 1877 Leonard

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Cane<sup>4</sup> discusses the connection of exophthalmic goiter with mania. Savage<sup>5</sup> in 1882 reported several cases of insanities with goiter, rejected the sympathetic theory, and maintained an open mind on the question of etiological relationship.

Since these early writings, articles too numerous to mention have appeared dealing with the various ramifications of this complicated subject. In one of the most exhaustive treatises on the relation of endocrine disturbances to mental disease Paul Sainton,<sup>6</sup> in a series of articles published in 1906, described mental conditions arising from alterations in many of the glands of internal secretion. He separated the symptoms due to thyroid intoxication into two groups, one of maniacal agitation, and the other a depressive type.

#### REVIEW OF LITERATURE

The first article on goiter operations in mental diseases was that of Berkeley and Follis,<sup>7</sup> who performed hemithyroidectomy in ten cases of catatonia. They claimed several cures and concluded that catatonia might be due to a hyperthyroidism or to a perverted secretion. Kanavel<sup>8</sup> in 1909, after operating on twelve patients with catatonia and observing improvement in only one, concluded that there was absolutely no justification for thyroid surgery in this condition. Winslow<sup>9</sup> in 1910 reported five cases in which operation was done with rather discouraging results. However, he believes that there may be some connection between the thyroid and the mental disease in question. Weinberg<sup>10</sup> in 1922 reported a case of dementia praecox and one of manic depressive insanity, each with exophthalmic goiter, and both of them cured after thyroidectomy. Eastman and Eastman<sup>11</sup> performed hemithyroidectomy in four cases of dementia praecox in which one lobe of the thyroid was enlarged, and noted entire relief of the affliction in each case. Boys<sup>12</sup> in 1926 reported eight thyroidectomies for cases of goiter with well-marked mental symptoms, with six complete recoveries. De Courcy<sup>13</sup> this year reports fourteen operations on insane patients with Graves' disease with twelve complete mental recoveries.

During the past four years Dr. Margaret Smyth, assistant superintendent at the Stockton State Hospital, and the writer have operated on fifteen goiters at the State Hospital and at the Clark Sanatorium in Stockton. We are indebted to Dr. Fred P. Clark, superintendent of the sanatorium, for permission to do this work, and for advice and counsel in its performance, which we wish to acknowledge at this point. This paper is based on the entire number of operations performed on such cases in this community, and on the results obtained, as all the cases have been followed up. These cases represent no especial group, either from the mental or somatic standpoint, but simply at random a series of operations on the most outstanding cases of thyroid disease that have occurred at hospitals for the insane in this community. In this respect this series, I believe, differs from any that I have been able to find reported in the literature.

#### EFFECT OF THYROID SECRETION ON NERVOUS SYSTEM

That the secretion of the thyroid gland has a profound effect on the nervous system and on the mentality of the individual, is so evident as to scarcely merit discussion. One has but to observe the profoundly toxic case of Graves' disease, or the well-developed case of myxedema to be convinced of this. On the experimental side Crile<sup>14</sup> has shown that the thyroid gland, through its control of iodine metabolism in the body, controls the electric conductivity of the brain. Extirpation experiments and thyroid feeding experiments supply much information. Without the thyroid the brain is dull and stupid, and in infancy does not develop. With excessive thyroid secretion the nervous system is tuned to a high pitch of reactivity, its balance is exceedingly delicate and overresponsive to stimuli. The mental response which one would expect from abnormalities in thyroid secretion would be that which most commonly results from any intoxication and, depending on stimulative or depressive factors, varies from delirium, through more or less agitated, confused states, to stuporous conditions. Just what connection the major psychoses may have to this type of disturbance is a matter of question. Werelius and Rydin,<sup>15</sup> in a statistical study based on examination of 4184 insane patients in Chicago, found only 6.45 per cent affected with goiter, which cannot be much above the incidence in that region among the sane. The percentage of goiters in dementia praecox, involutional melancholia, and simple depressions was somewhat greater than this average. Strangely enough they found in catatonia, about which so much has been written concerning its supposed resemblance to exophthalmic goiter, and its improvement after thyroidectomy, thyroid enlargement was rare—93 per cent of the goiters in dementia praecox occurring in the hebephrenic form.

The mental disturbances of the somatic type, which we know from common clinical experience to be due to thyroid diseases, are met with very seldom in insane hospitals. They are commonly recognized as intoxications and not frank psychoses, and are dealt with in our general hospitals.

#### RELATIONSHIP BETWEEN GOITER AND MAJOR PSYCHOSIS

We might postulate the several possibilities which occur to us regarding the relationship that goiter may play to a major psychosis, as follows: (1) that it may be incidental, and have no effect on the psychosis; (2) that it produces a hyperthyroidism with an agitating and unbalancing effect on the mind; (3) that it produces a hypothyroidism, with a dulling effect on the higher centers which through lessened control become alienated; (4) that it produces a perverted secretion, or dysthyroidism, with a specific effect on the higher centers; (5) that a large goiter through pressure on venous return produces a congestion of the brain with a psychosis dependent on abnormal circulation; (6) that it supplies a point of irritation of any type which brings out or

exaggerates the inherent characteristics of an unstable individual, causing the development of a frank psychosis.

In studying the records of these fifteen cases (the histories of which, unfortunately, time will not permit me to read) we have been impressed by a number of interesting points, which the following statistical summaries will bring out.

#### TYPES OF GOITERS ENCOUNTERED

Regarding the types of goiter occurring, our series has consisted of fourteen adenomas, ten showing a multiple colloid type, and four a fetal pattern, and but one hyperplasia with exophthalmos and this in a case of extremely bad epilepsy, in whom psychosis, if present at all, was a minor feature. As perhaps the most profound thyroid toxemias occur in exophthalmic goiter, we were surprised to find practically none of this type of goiter occurring among the insane. A series of goiters at random among the sane would show a higher percentage of exophthalmic type than we have found among the insane. This agrees with the survey of Werelius and Rydin, who out of 4184 insane patients found 270 goiters, only two of which were of the exophthalmic type, one being an epileptic psychosis and the other an undifferentiated depression.

Our series consisted almost entirely of adenomatous goiters. All were females; their ages varied from 26 to 64, the average being 41. In 53 1/3 per cent the goiter could be traced to well-known endemic localities. In 40 per cent of the adenomas there was a history of goiter in other members of the family. The duration of the goiter before development of mental symptoms varied from three to thirty years in the adenomas, and averaged fifteen and one-half years. This is not far from the average duration of an adenoma before toxic symptoms develop. However, we cannot say that many of the patients showed definite hyperthyroidism clinically. Out of fourteen adenomas only five, or 35 1/2, per cent showed clinically signs of hyperthyroidism, most of these being only slightly toxic. At least two were definitely hypothyroid. In many cases the endocrine status was very difficult to judge on account of the mental condition. We found it utterly useless to attempt to measure basal metabolism, except in a few, on account of lack of coöperation. In the maniacal type neither the pulse nor blood pressure could be relied on to give any clue to toxicity estimation. Definite obstructive circulatory signs could be found in only 33 1/3 per cent. One-third of our cases also revealed definite family history of insanity, probably a figure not high enough to represent the truth.

#### DIAGNOSIS IN CASES OPERATED AND RESULTS OBTAINED

The diagnoses in this series of cases were fairly representative of the usual percentage of the non-organic major psychoses in hospitals for the insane. We operated on five cases of dementia praecox, four of whom were unimproved by operation. In these the duration of the psychosis had been from four to seven years, and they were all bad cases. In the fifth the patient could be

said to be improved, as she was violent before operation, and afterward became a good, quiet, trustworthy worker. However, she still has hallucinations and, therefore, cannot be said to be cured. The duration of her psychosis before operation was only two years, the shortest duration in the praecox cases we operated on. These cases were all hebephrenic or paranoid types. We have seen no catatonics in these institutions with well-marked thyroid disease. We also did five operations on patients having the diagnosis of manic depressive insanity. Three of these were of the depressed type and two were of the manic type. All three of the depressed type recovered mentally shortly after their goiter operations. Two were followed four years, and the other over two years after operation, and all were continuing perfectly well. Of the two manics one recovered mentally shortly after operation, and the other continued in a maniacal state unaffected by the operation, and died sixteen months later of maniacal exhaustion. One case, diagnosed involutional melancholia, who had been insane for one year before operation, was discharged as well four months after operation. One case, diagnosed psychosis with somatic disease, with a delusional insanity, recovered and was discharged four months after operation. One case of arteriosclerotic insanity in a woman aged sixty-four, with a large goiter, died two weeks after operation of cerebral arteriosclerosis. One very interesting case was an imbecile, age forty, who had a large goiter and had been an inmate of a home for feeble-minded for twenty years. For several years prior to operation she had been doing housework very well. She then became hysterical and developed delusions that someone was pulling her right ear and harassing her by driving swarms of bees around her. She was diagnosed as insane and sent to the State Hospital. Examination revealed a goiter extending from just below the lobe of her right ear on the right side, to an intrathoracic nodule on the left, which gave rise to a very loud buzzing bruit. After operation her delusions, which were really illusions, disappeared, her hysteria with them, and she is again a good worker. Our only case of exophthalmic goiter was an epileptic with an extremely toxic condition. Three operations were done on account of her condition, first a ligation, and then thyroidectomy in two stages. Her epilepsy was not improved, and she died seven months after operation in a convulsion.

#### CONCLUSIONS

It is quite apparent that there is no very simple etiological relationship between the ordinary form of thyroid intoxication (hyperthyroidism) and the major psychoses. Much has been written about exophthalmic goiter operations in the insane. It is our opinion that hyperthyroidism is rarely found in the true psychoses. An extreme hyperthyroidism resembles mania very closely and a delusional state may simulate dementia praecox, which is no more a psychosis than a typhoid fever delirium. We are inclined to think that many of these cases reported in the literature may have

been toxic deliriums rather than true psychoses. As to dysthyroidism or perverted secretion being a factor in these cases, no very good evidence has ever been brought forth to show that there is such a secretion possible, so we have disregarded this theory. Many large goiters produce a hypothyroidism, and this is much more apt to be a factor in this type of mental disease than a hypersecretion. Certainly hypothyroidism is a potentially toxic condition. However, we are inclined to believe that in most of these cases the goiter supplied a point of irritation which played a more or less important part in bringing out the inherent characteristics of a mentally unstable individual, and producing a true psychosis. Certainly anything that is apt to improve the general health of the body is going to increase the likelihood of recovery from a psychosis. The earlier this is done, before permanent physical changes take place in the corticocerebral cells, the greater the benefit we would expect to reap. Thus we obtained no results in our cases of dementia praecox which were severe and of long standing, but 80 per cent of all other cases than dementia praecox recovered from their psychoses. Despite the fact that most of these patients were very violent, we encountered no insurmountable difficulties in handling them postoperatively and, in fact, had no surgical mortality whatever. We are inclined to believe that the coexistence of goiter with major psychosis not only does not constitute any contraindication to operation, but that, on the contrary, the operation should be done, as it may break a link in the chain of etiology of the psychosis. Operation offers a prospect of cure; in fact, except in long-standing cases, a very good prospect.

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#### DISCUSSION

THOMAS G. INMAN, M. D. (879 Market Street, San Francisco).—It is an old observation that the nervous system is especially disturbed in affections of the thyroid gland. Graves spoke of the similarity of goiter symptoms to hysteria, and the French regarded them as the result of a neurosis.

While nervous symptoms are fairly constant in thyroid disease mental disturbances of a grave character are more rarely found. Abnormal irritability, rapid flow of thought, excitability without apparent cause, are common in increased activity of the thyroid. In severe cases there may be delirium, confusion, and coma. Hallucinations may occur. When the mental symptoms are of sufficient moment to suggest the presence of a psychosis the clinical picture, if dependent solely upon the abnormal thyroid function, will be recognized as a toxic psychosis, which, in reality, it is. These toxic mental symptoms should disappear with improvement in the thyroid disease regardless of whether medicine or surgery is responsible for the change. Attack upon the main problem, the thyroid disease, should be prompt and decisive. The mental symptoms will take care of themselves.

Occasionally thyroid disease develops in individuals already the subjects of a true psychosis but in whom the thyroid disease bears no causative relationship to the psychosis. Here a careful history, family and personal, with close examination of the psychosis itself may serve to clarify the situation and act as a deterrent to operative treatment. In patients belonging to this group the psychosis is rarely improved by surgical interference.

Into a third group will fall those unstable individuals whose mental balance is easily disturbed by exciting or depressing influences arising either within themselves or in their environment. The sudden lighting up of an old goiter may be sufficient to incite disturbances in the mental sphere and lead to the necessity of deciding upon the question of special treatment for the thyroid condition.

Unfortunately, in these patients, objective signs of thyroid disturbance are not marked and are estimated with difficulty. It is upon the clinical judgment of the medical attendant that dependence must be placed for the proper estimation of the influence of the thyroid on the mental upset.

There must necessarily be some errors in selecting proper cases for operation, should operation be the method of treatment indicated, but if preliminary studies, such as the nature of the case will permit have been carried out, occasional failures in obtaining a regression of the mental symptoms will be excusable.

The foregoing generalizations on the subject of psychoses in thyroid disease are supported by the experience of Sanderson and Smyth. Their deductions seem legitimate and go only as far as our present knowledge of the subject permits. In a small group of cases it is impossible to come to any hard-and-fast conclusions. Particularly is this true of the manic-depressive group where a recession of the psychotic symptoms may occur spontaneously. However, a selection of material, based on the results obtained in this study, would probably show a larger proportion of recoveries than are here reported.

In considering the relationship of somatic disease of any kind to an existing psychosis one must keep in mind something of the idea expressed by Esquirol more than one hundred years ago. "Every kind of organic lesion observed in the bodies of the insane has been also found in the bodies of those who never evinced a symptom of insanity."

CLARENCE G. TOLAND, M. D. (1930 Wilshire Boulevard, Los Angeles).—The influence of thyrotoxin upon the psychic state of an individual is a subject of considerable interest and importance, particularly to the psychiatrist and to the surgeon.

Doctor Sanderson's and Doctor Smyth's interesting paper is a valuable contribution to the problem.

It is difficult to prove that toxins of thyroid origin can produce definite mental disturbances, such as the major psychoses, but we must admit this possibility when we consider the important rôle other toxins play in the etiology of the insanities.

It is true that exophthalmic goiter rarely occurs in the insane, but not infrequently cases of exophthalmic goiter are found *among* the insane. These have been wrongly diagnosed and are merely manifesting phases of the depressive or stimulative effects of the toxic thyroid. The man who removes these unfortunate individuals from their environment and by proper treatment effects a cure certainly performs a very great service. Would it not be advisable for all institutions for the insane to employ someone especially qualified in diseases of the thyroid to examine their patients at intervals and attempt to segregate these cases?

The adenomatous goiters are of more frequent occurrence and, when toxic, they undoubtedly aggravate a preëxisting psychosis. A subtotal thyroidectomy is indicated in the majority of this type, but there is a certain percentage who are better left alone. In our experience many of the cases were considerably benefited by an operation, but very few of them received a complete cure. They were able to work, perhaps, but they always seemed to remain mentally unstable. In two cases of dementia praecox no benefit was obtained. One case of true hallucinations and delusions, prior to thyroidectomy, became violent and required restraint for about three weeks after the operation. She was eventually benefited, but is still quite depressed.

Any insane patient with a toxic goiter should be given the benefit of a subtotal thyroidectomy, for he has little to lose and much to gain; but the results as a whole are not very stimulating to the surgeon accustomed to the marvelous results following similar operations upon sane individuals.

Among certain of the laity there is a belief that occasionally insanity will occur after the removal of a goiter, and not infrequently we are asked this question by the anxious relatives of our patients. This unquestionably is merely a superstition founded, possibly, upon the infrequent case of postoperative myxedema, for we have never known a goiter patient without insanity to form a true psychosis as a result of a subtotal thyroidectomy.

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DOCTOR SANDERSON (Closing).—I wish to extend my thanks to the doctors who have discussed our paper, and especially to Doctors Inman and Toland, whose kindly and thorough discussions of the subject are a real contribution. We do not claim to have accomplished anything spectacular in our treatment of this series of patients, but so little of a definite nature is known of these psychoses, and there is so much reason for suspecting a subtle underlying endocrine basis for at least some of them, that we thought that anything that might shed any light on their relation to the thyroid gland, the keystone of the endocrine arch, would be well worth while. While we had this underlying purpose in mind in presenting this series, in most of the individual cases there was an additional definite indication for operation, such as size, cosmetic considerations, actual obstructive phenomena, or toxicity.

## INVERSION OF THE UTERUS\*

### REPORT OF CASES

By EDWARD N. EWER, M.D.  
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DISCUSSION by H. A. Stephenson, M.D., San Francisco;  
John C. Irwin, M.D., Los Angeles.

TWO patients with puerperal inversion of the uterus came under observation in Highland Hospital during the year 1928. Both were treated by vaginal hysterectomy for reasons stated in the case reports which follow. According to the usual classification, one would be called chronic because the inversion was treated several weeks after its occurrence, and the other acute because the whole series of events took place within twenty-four hours. Both patients recovered.

### REPORT OF CASES

CASE 1.—G. I., age 21, was admitted on the gynecologic service because of bleeding from an inverted uterus.

The bleeding had been continuous since the birth of her baby in another hospital four weeks previously. The pregnancy was normal and the delivery at term was spontaneous after a labor of eight hours.

She states there was difficulty in the removal of the placenta, it being accomplished in about fifteen minutes by vigorous fundal pressure with one hand, and manipulation in the vagina with the other. Excessive hemorrhage immediately followed. There was no pain then nor during the weeks following. She was given a blood transfusion twenty-four hours after delivery. She left the hospital in an ambulance after two weeks, and the inversion was discovered by her physician at an examination made later in her home. No attempt was made at that time to replace the uterus.

On entering Highland Hospital this patient's temperature was 99, pulse 130, and respiration 24. There was a slight systolic murmur heard at the apex. Blood examination showed: red blood cells, 1,430,000; hemoglobin, 30 per cent; white blood cells, 9150. There was a foul-smelling bloody vaginal discharge. Examination disclosed the completely inverted body of the uterus in the vagina with the cervix tightly contracted. The patient was in charge of Dr. Clarence Page, who attempted to reduce the inversion by taxis. This failing, he performed a Spinelli colpohysterotomy. It was found that the efforts to reduce by taxis had partially ruptured the softened anterior wall. After the incision of the cervix had been continued nearly to the fundus the uterus was easily replaced. However, in attempting to repair the incision the tissues were found to be so friable that it was impossible to place the stitches so that they would support the wound edges in coaptation. The uterus was therefore removed.

During the course of the operation 520 cubic centimeters of blood was given by direct transfusion. The temperature for six days following operation ranged between 99 and 102. The patient was discharged in good condition, other than the anemia, at the end of three weeks.

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CASE 2.—L. B., para 2, white, American, age 23, admitted July 20, 1928 in first stage of labor at term. Her first labor had lasted twenty-four hours, ending with forceps delivery. The puerperium was normal.

The present pregnancy was uneventful. The labor lasted five hours, resulting in delivery of a normal infant in L. O. A. mechanism. The cord was around

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